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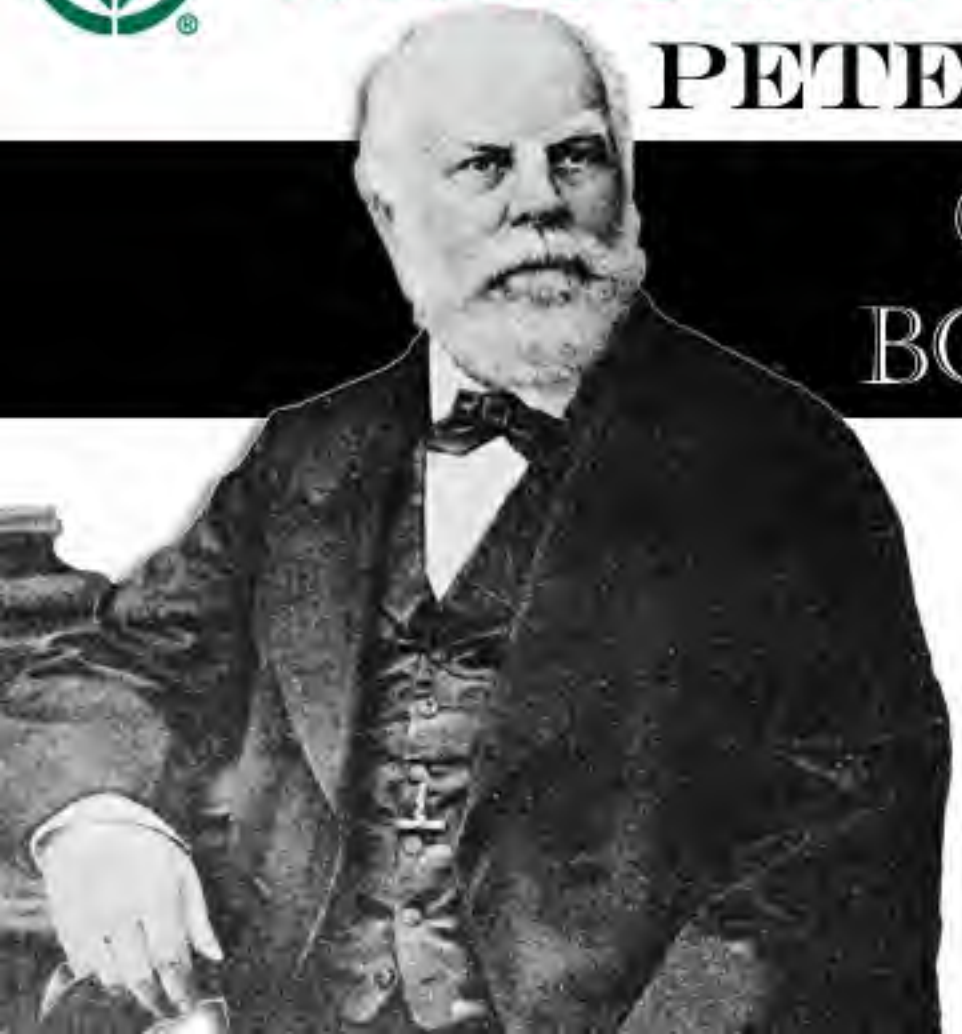

Pagination Note:
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1765-1788.

Opuntia: Morphology, System, Mixed.

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Menzel, catholic priest, Bohemian
in Texas sent seeds
and made collections
in return

Vienna Jan 1858

3035

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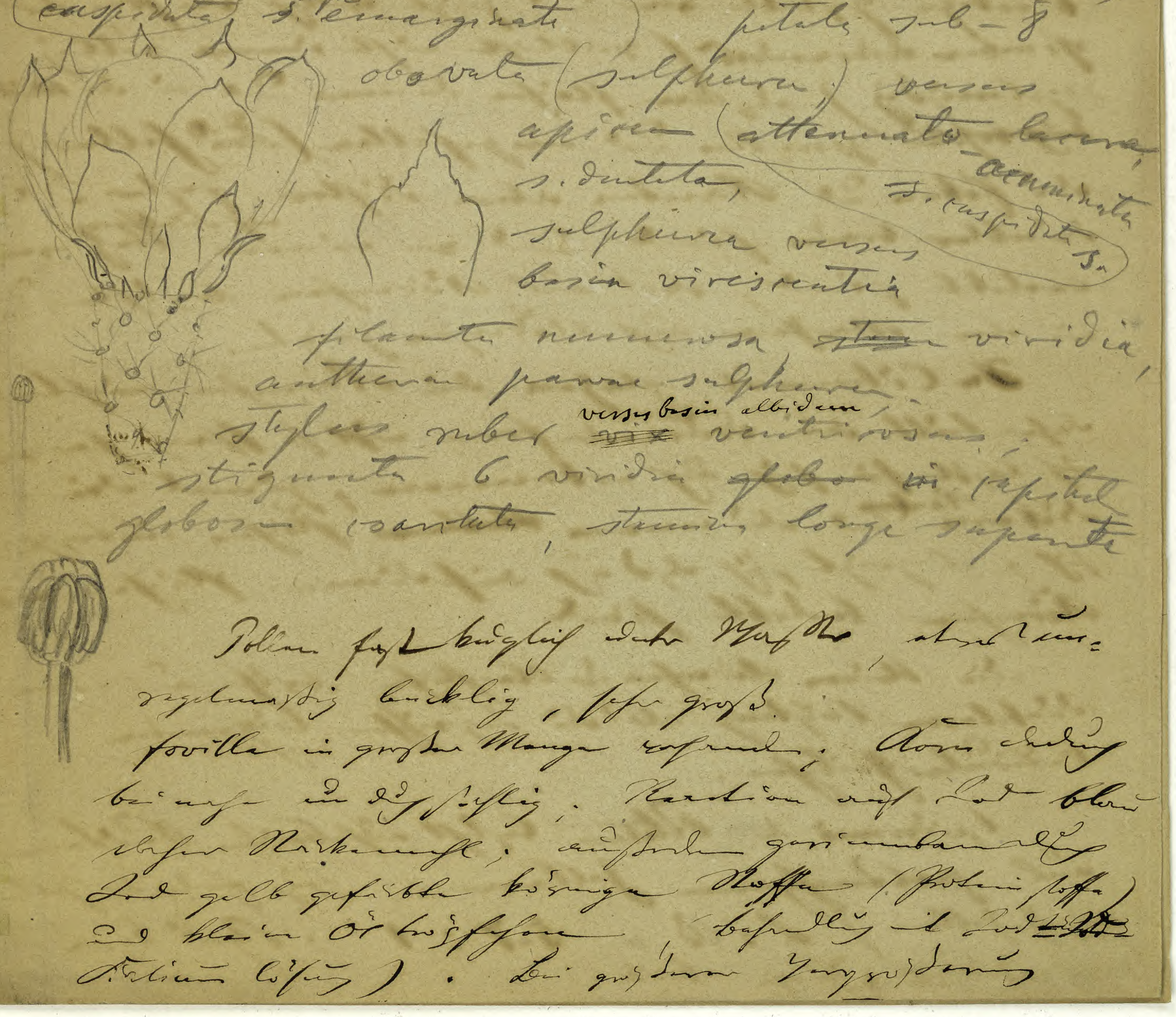
1/

Opuntia leucotricha Hort Bot Bonn 10 Jun 1858

Ovario-obovoideum 8/13 areolae (circ 45–50) approximatis
prope-tomentosae ~~et~~ aculeis albidis setiformibus
inaequalibus 3–6–8 stipatae (2–6 lineas long)
21 sepala (8/13) ext. caerulescenti-cuspidata, int. angustiora
interiora oblanceolato cuspidata, intima obovata,
(cuspidata) s. acute emarginata petala 7–8
obovata (sulphurea) versus
apicem (attenuato-lanceolata, s. dentata,
s. cuspidata
sulphurea versus
basin virescentia
filamenta numerosa ~~flava~~ viridia,
antherae pravae sulphureae,
stylus niveus versus basin albidum
stigmata 6 viridia globosa in capitulum
globosum connata, staminibus longe superantia

Pollen fast kugelig dicht Masche, abwechselnd
regelmäßig dicklig, sehr groß.
Fovilla in großer Menge vorhanden, Korn dicht
beisammen in der Größe, Reaction auf Jod blau
ohne Verkleinerung, einzelne gummiartig
Jod gelb gefärbte körnige Masse (Protoplasma
Rest) blau in Öl beschaffen basselbe in Jod-Lösung
Pollen Körner). Bei gutem Vergrößerung



Narbenkörnchen oblong, 1 Ilig, 2 mal so lang als breit. groß, stark Molecular bewegt, beim Quellen Ilig, 2 mal so lang als breit. Mittelst Essigsäure, Eosin Lösung gelblich, Jod gelblich, Zucker violett

(groß, rundlich für Pollen Narben Körnchen)

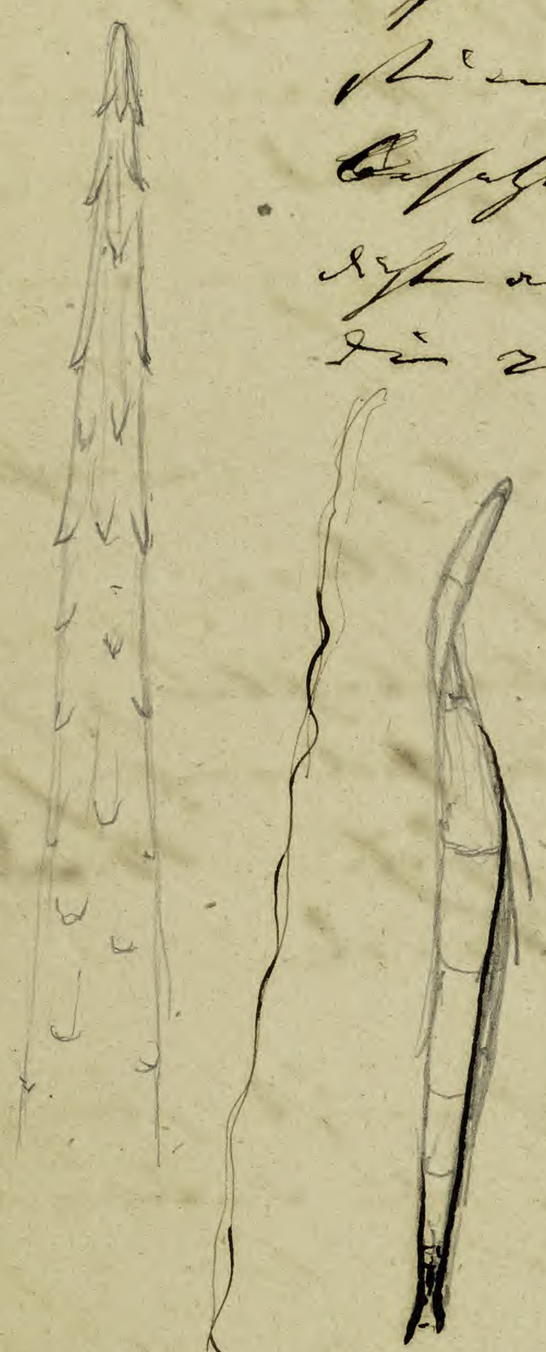
Narbenkörnchen $\frac{1}{360} - \frac{1}{180}$ m.m. lang

Mit Pyroschleim bedeckt, Papillen, die dem Rand zu 2 Reihen angeordnet, die dann mit einer 6 eckigen Epithelschicht zu liegen, die Form der Papillen beibehält, Zellkern nicht immer völlig regelmäßig, oft 2 Kerne, Papillen einzelne (Papillen) die Ecken der Körnchen oben dicker, Kern auf einer Platz verdickt, Cuticula dicker, Kern auf einer Platz verdickt, in den Narben der Körnchen zieht.

Die Cuticula der Körnchen ist glatt, Narbenkörnchen ist oberwärts offen, Pyroschleim, Zellkern, Zellkern, Zellkern

Pflanzenwuchs ist kräftig oder allgestalt, abgesehen
Blumenstiele öffnen sich zu prächtigen; Farben
völlig, Blumen rund prächtig gerichtet (mit sehr
lebhaften grünen Farbentönen)

1/2 Loc. 5-06.



Stengel bis den Dolden mit weißen mit
kleinen kurzen Haaren rückwärtsgebogen
besetzt, mit oben rauh die Haare stehen
dicht angedrückt, oder etwas abstehend Blattstiele
die zwei Reihen sind alle die Seite der Stengel
(mit Spitzen nach unten) die Haare sind
die Haare, welche gegen die Spitze der Blätter
Dolden, welche gegen die Spitze der Blätter
Dolden, welche gegen die Spitze der Blätter
Dolden

Blattes.

[illegible] [illegible] [illegible] [

Opuntia polyacantha

Caspary in Hort. Bonn. 30/7 1857

Copy of some figures

(dürfte richtig)
Caspary

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3. ausgewachsene Blüthen dürftig, Inflorescenz des Petalo
des Kamina, bei a : b bis [illegible] allmählig
zur Blüthe gestielt ab, die Ablösung [illegible]
merkwürdig. die obere [illegible] Theil
[illegible] Ovar ? [illegible] trägen und an einem
[illegible] Verbindungsstiel zusammen.
abwärts geht [illegible] die Receptakel kurz
[illegible] [?]

4. Der Kopf der Stigmen [illegible] Anfang [illegible]
des [illegible] die Papillen [illegible], 2-3 Zellen lang
[illegible] die [illegible] ab [illegible] Zeit [illegible]
6 Ovulum, funiculus 1/4 mal [illegible] der [illegible]
gewachsen, [illegible] axatrop [illegible] aufrecht.
Exostom [illegible] die placenta [illegible] die innere
der micropyle zugewandt Seite der funiculus,
einfallig (oder mehrfallig?) [illegible] artig
9 Ovulum [illegible], Integumente [illegible]
der funiculus [illegible] ist [illegible] oder Ovulum
[illegible] [illegible] [illegible] [illegible]
[illegible] Zeit [illegible]
Zeit der Befruchtung

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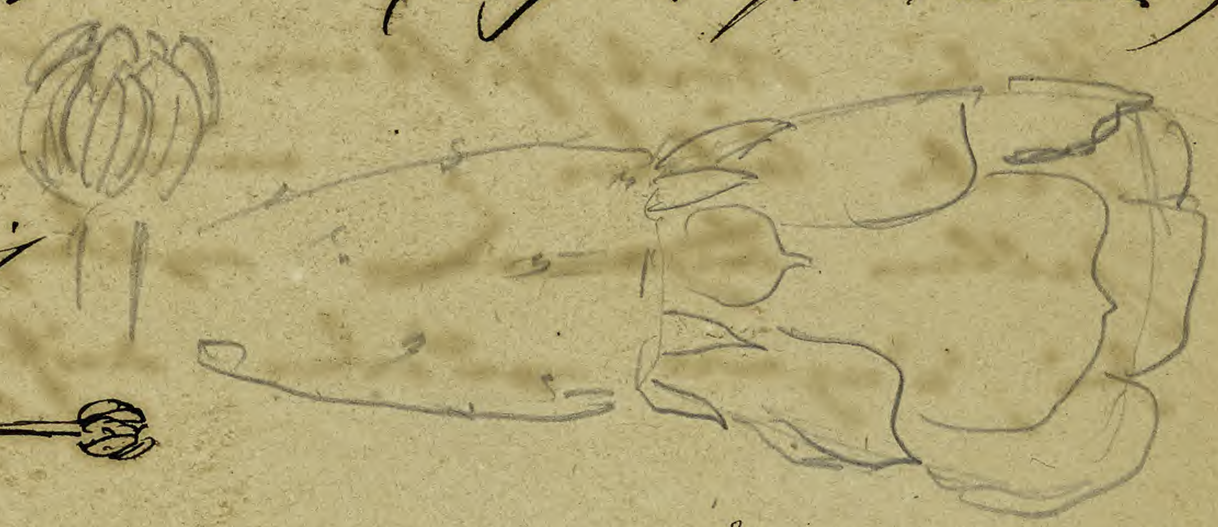
Juni 1858

Opuntia elatior " Hort Dorn [" Porsp. Gmelig
" O. Dillenii "] stangenrund, gleich mit starken Federn
2 3–5 spitzen Borsten; Stamm 5–7' hoch;
Aeste 2', stark 4 Zoll, Oberfläche rindig, Borsten
meist abgefallen. —

Blüthe: Ovar 1/4 Zoll lang, fast 2 förmig, überzogen
mit Schuppen, welche 1/2 Zoll lang, grün; Blüthe 1 1/2–1 3/4 Zoll lang, gross; 25 circa
Petala einreihig – oberst, — 11 einzeln
Stamina, gelblich; Stigmata (5) 7 planen
gelblich grünen
Kreis lang als die
Antheren. Stylus röthlich
Länge an der Basis
grünlich



Pollen häufig, zeigt mit Präparaten gleichen aber
oft regelmässig zu Ei. Cereotricha; als Ei der
einfach 12, oft 15–18; die Haut zerreisst,
Eier häufig aber oft entfernt; gelbliche feine
Körnig. —

Ovulum grün, ganz ähnlich dem von
O. Cereotricha, aber die funiculus ist
an der einen Seite mit feinen
(einzelligen) Haaren, bis in die Mitte

axillas artig. Integument. fracc. —

Ovarium oberst. dist. voll Krystallchen, kürzlich — kein gallsaure bemerkt. Falle polygonal, ff bestig

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Opuntia tomentosa ? 6-7 fach. epidermis besteht mit langen einzelligen Haaren; mit polygonen Zellen, zahlreich Krystalldrusen. An a. im zweiten Falle beginnen sich die Korkschichten zu bilden, sehr die Rinde bilden. — mit die äußersten älteren Zellen [illegible] absterben der Oberfläche die, [illegible] dichtgelöst. —

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Rec^d July 7th 1856

Opuntiae.

O. humilis (mihi) filipendula

O. humilis. = ~~pulverulenta~~ E. which, I believe now beyond doubt. Rio Bravo valley.

O. violacea (mihi) = O. phaeacantha — do. — do. — do. (Spines long, slender and more or less of variegated color like Porcupine quills. (Rio Bravo valley).

O. occidentalis? patens mihi ~~ref~~ is to be referred to O. elliptica of San Pascual. Yellow reddish flower, large joints. Stem & when old woody like most of these Opuntias. This plant covers often exclusively patches almost of half an acre. Therefore the name. The plant is more or less spiny, the number of spines however are not essential as they vary very much. The branches of this plant, often placed horizontally giving to the whole a subprostrate appearance. Joints are very large and areolas distant and procumbens would not be an improper specific name.

O. basilaris E.? I believe Bigelows observation is correct as to consider the joints generally rising from the base. If I remember it well, the plant and only specimen which came to my sight was of a similar growth. I at the time of its passed flowers took it for the same specimens as the one from the dividing ridge of the California Cordilleras, for which reason I carried them under one name "exaculeata." The latter I saw three or fourtimes and found higher growing than the former. Its growth is erect. The joint of which I sent You a sketch; returned to me now, was larger about one third. Its elongated elliptic or ovate shape seems to me not to be constant, as I saw joints of apparently the same plant, if not upon the same root quite approaching quite a circle. The lines drawn on the sketch and not to be understood by other persons are mere indicatory lines for my memory to represent the joint half dry shrunk, in which I saw this plant frequently. — Afterwards a similar plant came to my sight which I also took it for the same and therefore missed to collect it. It shew the same inclination to a purpurescent color all over, Stems erect 2,5 – 3' high, joints round. No flowers or fructification seen. Locality Sta Cruz river valley between Tucson and 111° Longit.

Opuntia glauca (mihi) most probably identical with O. purpurascens (mihi) and likely also with O. Emoryi E. The flower of O. purpurascens (mihi) was the sole specimen in flower I found at the time in the Colorado desert and suppose it was blooming anticipating the season. The proper season seems to be Aug. & September. During this time I saw the most of this species in flower and fruit. The Colorado desert extends from the foot Eastern Root of the Californian Cordilleras nearly all through to the country to the base of the Sierra Madre and its outlayers. This desert however is much intersected by Sierras dividing the whole and in many stripes of desert land.

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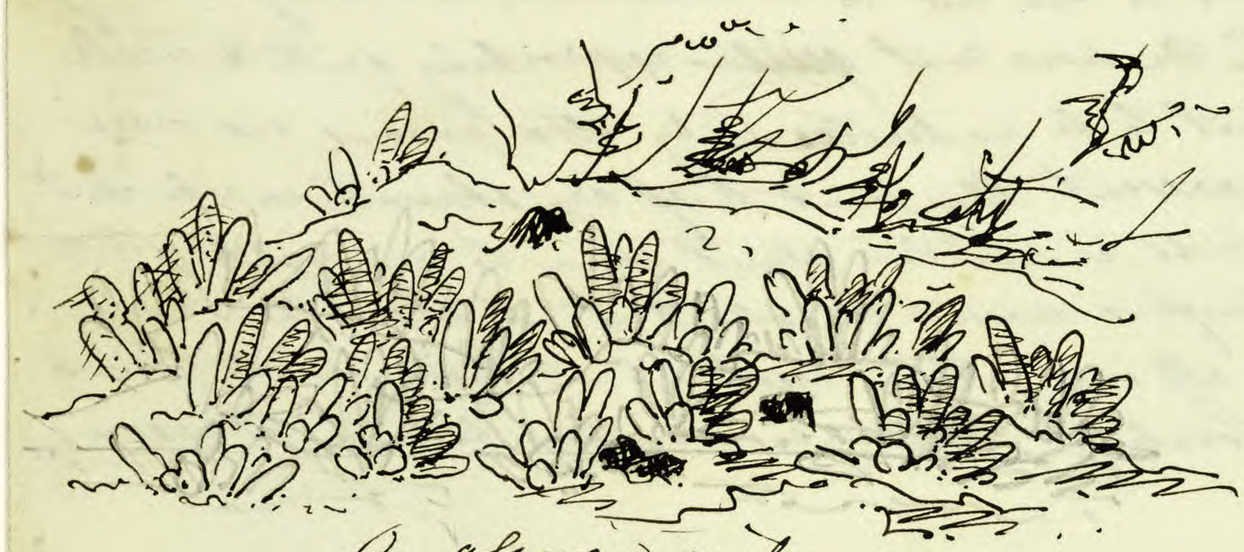
When I use the term Colorado desert I mean to say valley of the Colorado between the cordilleras of California and the Sierras of Sonora. Thus far as Wrights & Bigelows observations are concerned I can say nothing, except that Bigelow when we together met O. Schottii (Engelm) on the rio San Pedro of Texas, he proclaimed it instantly for quite distinct from the one of the upper rio Bravo near El Paso. and so we took it up together. The habitus of this Texan Cactus Opuntia appears to me also different from the one of Sonora. The Texan plant is procumbent if not creeping, the joints are slender clubshaped whilst the Sonorian plant forms only single and simple erect joints of a cylindric shape. The Texan is met with only in small patches formed by one plant whilst the Sonorian associates in large patches aggregations of from 20 to 40 individuals. I mean to say the plant is 12–18 inches high joints largest to 6–8!! The young plant is bright green, the spines more or less purple a tendency pervading the whole plant especially the sulfur-yellow blossoms. Short after the joint is formed its colour turns dull greyish-green, therefore my the name given by me. The reddish-brown spines are one inch and more long. The patches of this plant under the shelter of which the flying sand collects itself forms a sort of a „ malepartus " for snakes, mice, wood rats, ground squirrels. ?? The skeleton shows but a very obscure texture and seems to have a strong inclination to decay.



O. glauca mihi.

Piece of skeleton.

Opuntia litoralis = O. serpentina

A mere accident brought the a single flower late in season into my hands. The plant has in habitus some resemblance to O. polytuberculata mihi. The tubercles however are more distinct, the joints more deeply grooved. Its mode of growth appeared to me less serpentine than stoloniferous and this was the only character by which I was able to distinguish the plant from my O. corallina. Afterwards I thought O. serpentina was not growing so large then O. corallina and I believe this view was correct. It is really a smaller form. From O. sterilis (mihi) it differs, I believe by its more elongated cylindric joints, which bring it in habitus nearer to O. polytuberculata (mihi). This however is the correct in joints and by this mark easily distinguished from others. O. serpentina E. & O. corallina (mihi) I examined with me two obscure forms, as I was late in season along the coast. The color of both these forms is alike bright green. Of O. serpentina I saw newly grown joints 12–18" long. The ramification of O. serpentina also resembles a little that of O. arborescens, but it is not so regularly verticillate. and The joints of the

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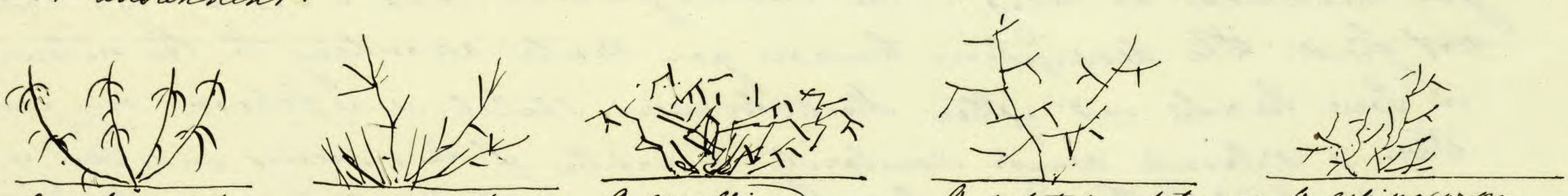
~~the latter~~ latter are more or less pendulous those of serpentina either horizontal or adscendent.



O. arborescens. O. serpentina. O. corallina. O. polytuberculata mih. O. echinocarpa.

O. echinocarpa. The difference shown by various individuals of this species seemed to me of no importance. The decidedly clavate shape of the slender joints aided me usually in its recognition.

O. corallina (mihi) The boldest of all the cylindric Opuntiae, which I met. It forms really gigantic bushes, with a very dense endless ramification, producing numberless short ovate-cylindric joints. Flowers of which I saw only poor remains or flesh buds not developed must be red. The diameter of the stem is quite large, and I say not to much when I state ~~them~~ the thickest to be 5-7" of this size I saw frequently the dried up skeletons. Fruit not known to me.

O. Whipplei Eng & B. Slenderness throughout is a characteristic of this plant. Much tuberculated but the tubercles are comparatively small and somewhat applanate, their outline form approaches a square or rhombus. Spines but few short and slender. Few branches and few joints, the latter terete and very much elongated. Flower terminal or nearly so. — Mr. Stanley's drawing in Emory's 1th Report ~~may~~ if correct, may be referred to this species. In regard to the tubercles of the various species of cylindric Opuntias I think there is some morphologic difference.

Oval full rounded swelling tumid. } Type. O. mamillata. & in som degree O. arborescens.

Clubshaped. O. sterilis mihi. echinocarpa. &.

lageniform. dry, compressed O. fulgens.

wedge shaped. O. corallina mihi. O. serpentina &.

rhombidal O. polytuberculata.

There must allowed some modification in regard to the shape of these forms: ~~this~~ ~~figures~~ The rhomboidal form I found most changeable and it ~~has~~ would have been difficult to recognize for instance O. polytuberculata if it had not been for the tuberculosity of this plant together with its slender growth. Prolific propensities is quite common in the first place with O. fulgens (O. Lindheimeri) O. polytuberculata and I believe also with O. echinocarpa. Also with O. fruticosa & ficus (mihi). ~~and finally with~~ I think it rather probable also with O. ramosissima. I do not recollect of having seen O. mamillata in that state, though it is very likely on account of its rich juicy nature.

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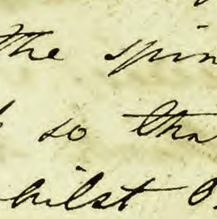
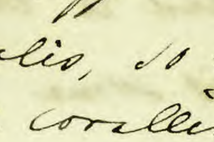
O. fulgida E. sen fulgens ? E. = O. lux loyoti (nobis). The living specimen you mentioned as being in the Puplic gardens where I was to day I could not find. The description however you make according to the material in Your hands and after Woolthonsers sketch is a believe very good. There is certainly much similarity in habits of this species and that of O. corallina (nobis). The former however seems to me to be more an erect plant and congregates not as in large patches as O. corallina does. O. fulgida is growing in single occasionally in 2–3 very rarely to 4 or more stems. The fragility of its joints is always naturally exhibited by its loosing spontaneously the joints on its lower parts not replacing them, whilst O. corallina seems to incline to, an at least partial regeneration of joints. Higher degree of sterility I believe is met with on O. fulgida, analogous to the climate where it is at home. O. fulgida takes only the upper seam of the diluvial drift on the foot of the sierras, whilst corallina occurs only on the Seabeach near San Diego where I saw it and no where else. So both are belong to entirely different regions thus well in longitude as also in their elevation above the ocean. Thus far as I am able to judge the petals of O. fulgida are more linear and exerted than those of corallina. Of the latter I must say however that I only saw some few dendedry flowers and some undeveloped buds. The color of both these species and also the degree of their spinosity is quite different. The spinification with corallina is much like that of my O. littoralis, so much so that I could never find any distinction between this one and O. corallina, whilst O. fulgens is the most horrid thing to look at. Stem, epidermis and tubercles are not visible on younger joints, You only can fancy a tuft as created to furnish as nowrish those thus many long and sheathed spines as possible whilst on O. corallina the whole arrangement of tubercles, areolas and also the bright green shining joints are visible, the spines being short and I believe naked. The spines of O. corallina are rarely one inch long whilst those of O. fulgida are rarely less then 1" but mostly 1,25 – 1,50."

O. fulgida. E.

O. mamillata. (nobis) The flowers of this plant are not like those of O. fulgida O. fulgens or those of O. polytuberculata (nobis) except in color, which is rich pink or purple. What I recollect of the living state of the flowers of O. mamillata is, that the arrangement of its petals appeared to me as quaternary. The largest petals being in 4 are thus shaped  whilst those of fulgens are decidedly linear – spathulate  . So the largest petals of fulgens appear exerted by being much longer than the rest. This is not the case with the petals of O. mamillata. Here the petals diminish

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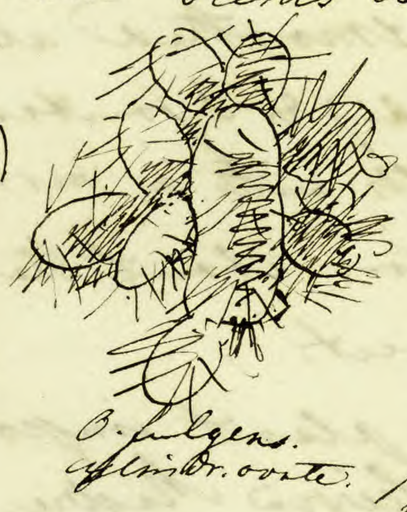
gradually towards the sepals. The formation of Staminodias, though I do not remember of having really noticed such is very probable as the very incident ~~fusiy~~ character of this plant may favor such formation. The same peculiarity may be the cause of the light spinification of this plant. I may call it, few spines or none at all. The joints though full and swelling are still more cylindric as those of O. fulgens. the joints of which may be ~~styled~~ almost ovate, whilst O. manillata seems to be more abruptly articulated. Color of the joints of O. fulgens is dull greyish-olive that of O. m. bright lively summergreen and shining. Fulgens is spinosissima and unvariably always to whilst manillata is panci-spina or almost inerm. Of the buds I am hardly able to speak as I see very little of that part of the plant. Habitus of both plants which I found growing near to gether is dendroid in which respect the approach each other but only in this point. O. manillata I never saw reach the dimensions of O. fulgens. The fragility of manillata compared with that of fulgens stands at zero. To deprive the plant of its joints each one wants a good blow, whilst the joints of fulgens fall off like overripe apples by the slightest shaking. I hardly can believe that there can exist a close relationship between both. Manillata is the plant of a more favorable climate and especially of a better soil then the other. Manillata occurs only South of the Boundaryline whilst fulgens inhabits all the more elevated barren plats and mountain slopes up to the Gila.

O. manill.
joints cylind. trunc.



O. fulgens.
cylindr. ovate.

Opuntia teres Sen O. Schottii The plant which I met some 6-8 miles South West of the Maricopa village near the Mouth of rio Salinas into the Gila is truly dendroid and more arborescent as the species bearing that specific name. Though it may considered less ramose then O. corallina (mihi) it is, nevertheless a species very much branching though its long slender joints are not able to produce so dense a crown as for instance O. manillata, which grows more scrubby. Both however approach each other in forming upon one stem a dense globular crown, the one of teres perhaps more depressed. I have no doubt that

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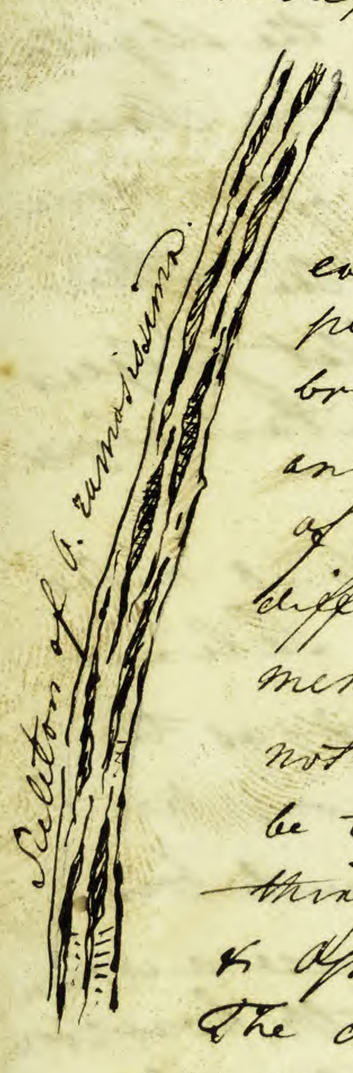
3041

the color of the flowers have a tendency to turn into brickred as the xanthic greenish color of those I saw may indicate. The innermost row of petals I call linear-lanceolate, perhaps better spathulate exerted that is overreaching the other petals & very far, which makes the structure of the flowers somewhat like ~~the~~ that of O. fulgens. The habitus of its long slender joints with their singlespiny ~~&~~ approximate areola brings this plant right near to O. frutescens so much so that I took it at first sight for an arborescent variety of this plant until I looked closer to the flowers. The structure of the latter and its smoothed almost glabrous joints place the O. Coles between O. tunicata (mihi) & O. frutescens. The old stems of this plant too becomes very smooth with a more persistent green shining unarmed bark. — Your supposition about the dimensions of and shape of petals seems to me to be correct.

O. frutescens β ~~si~~ Lindh. (mihi) The locality of this plant imports little, because it is a very rare species west of the Sierra Madre, where O. ramosissima takes its place. The occurrence of O. Lind is ~~not~~ I believe but sporadic. I myself did not consider it a distinct species but look at as a variety.

O. ramosissima. E. tunicata (mihi) The Boundryline made under the Gadsden treaty does not cross the Colorado of the West but commencing at 111° long. terminated on the banks of this river 20 miles below Fort Yuma. 31. 20. N. lat. The species in question ranges from the ~~ea~~ eastern foot of the Californ. Cordilleras to the Sierra Madre, on the eastern slope of which O. frutescens gradually takes its place. This O. ramosissima seems to belong to the basin of the Colorado and the Californian Gulf with its tributaries.



Wether the one form with bristly carpel may be a distinct species or even a variety, I can not say, as I found only two plants with this peculiarity standing among a whole host of others without those bristly coat. The plants of both have been apparently of the same habitus and so I considered this formation of bristles as a mere abortive freak of nature. There seems to be however a difference in the structure of the differently ~~co~~ colored flowers. The red flowered species having larger dimensions in the petals. Without witnessing other characteristics however I would not dare to pronounce the two as distinct species and so my notion would be to call them ramosissima L and β. micrantha and macrantha or some thing like. The morphological propensities of this class especially Cerei & Opuntiae are really troublesome and make decisions of the kind critical. The deep purple color of the one plant compared with the pale greenish yellow certainly is about to crack, because where flowers of O. Schottii or O. frutescens turn red, the color is shading in a related color commonly dull brickred.

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3040

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The dry persistent flower crowning the bristly carpel bears so much the stamp of being poorly developed, that it seems to me more probable that the bristly carpel is but an abortive growth. There is on some joints a marked tendency to produce besides besides the one regular 1,5–2" long spine one or more deflexed bristles or rudimentary spines, one or two of which occasionly become real spines. These bristles remind me on little scales or thick scaly rudimentary spines or real scales, produced by some other species of Opuntia Remarkable for that is my O. polyacantha, with which I often noticed this peculiarity especially on young opulent shoots. The same phanomenon I saw on my O. patens, which has the areolæ of its carpels also with like scales as if fitted out with stipules.

With these remarks now I feel pretty much pumped out and if the material offered should not suffice for farther conclusions You will let me have some more time to collect more. Respecting your wishes for more and especially more elaborate sketches and especially for the drawing of a map however rough I must confess that I am at present not at leisure for such, as I am engaged to bundle up and label the duplicates of the main portion of my botanical collection made over the same ground. I am charged by Maj. Emory with the finishing of some 36–40 Sketches of Landscapes to illustrate the topography of the Boundryline. In these plates I shall take occasion to make the foregrounds lifelike by introducing all those indigenous plants which appear most striking in the scenery of the country. You will easily understand what a prominent part the Cacti will take in those sketches. By frequent repetitions I will try to give the features and characteristics of almost every one through the various phases of their growth &c.

For this time please to take my best regards

Sincerely Yours &c

Arthur Schott

Capt. Emory, U.S. Topl. Engrs. with Kearney's Army of the West, Fort Leavenworth, Mo.

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

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P.S. I wish ~~You~~ to keep your letters at hand. In ~~the~~ case any more question should desirable to be ~~any~~ more answered, I could do it more easy and also speedily.

About Your drawings I do not know, whether any thing was done with yet. I believe they are still lieing in the Maj. desk.

A. L.